



## TECHNICAL MEMORANDUM

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<b>TO:</b>	Will Ernst, Mike Gleason (Boeing)	<b>DATE:</b>	October 26, 2005
<b>FR:</b>	Ted Norton (Golder)	<b>OUR REF:</b>	013-1646.002.400
<b>RE:</b>	Addendum 3 to January 7, 2005 Boeing Plant 2, 2-10 Area Excavation Evaluation		

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Boeing has performed excavation activities to accommodate foundation construction and installation of sub-grade utilities in the northeast portion of the 2-10 Building, as outlined in the January 7, 2005 memo, *Boeing Plant 2, 2-10 Area Excavation Evaluation*.

This memorandum presents analytical results for soil samples collected subsequent to excavation of soil in the construction locations. The soil sampling was conducted to support worker health and safety and soil characterization for disposal purposes. Soil samples were collected using hand auger sampling methods at nine (9) locations (Figure 1). Soil sample depths were based on excavations depths (<7.5 feet bgs). Multiple samples were collected at selected sample locations based on excavation depths. As the excavations did not extend below the water table, groundwater samples were not collected. Soil samples were collected in general accordance with the Plant 2 *Compendium of Sampling and Analysis Plans and Quality Assurance Project Plans for Boeing Plant 2 Seattle* (Golder, 2004). Only sample PL2C-2-10-E was collected within the boundaries of a RCRA unit.

Soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and metals. There is no historical information indicating the presence of polychlorinated biphenyls (PCB) sources (past or present) or PCB-containing electrical equipment in the identified construction area. PCBs were therefore not analyzed during this sampling effort. Table 1 presents constituents of concern (COCs) detected above their reporting levels for each of the soil samples. COC concentrations exceeding the 1999 Plant 2 PMCLs (Weston, 1999) are shaded.

With regard to SVOCs, three (3) samples had concentrations exceeding their respective PMCLs. Sample PL2C-2-10-A-0040 exhibited concentrations of benzo(a)anthracene (200 µg/kg), benzo(a)pyrene (100 µg/kg), and chrysene (730 µg/kg), each exceeding their respective PMCLs of 2.9 µg/kg. Sample PL2C-2-10-B-0040 had a concentration of chrysene of 7.6 µg/kg. PL2C-2-10-F-0045 had concentrations of benzo(a)pyrene (9.2 µg/kg) and chrysene (11 µg/kg) above their respective PMCLs.

Among metals, the only COC that exceeded its PMCL in any samples was arsenic. The PMCL (7.3 mg/kg) was exceeded in samples PL2C-2-10-A-0040 (8 mg/kg), PL2C-2-10-B-0040 (9 mg/kg), PL2C-2-10-E-0045 (8 mg/kg), PL2C-2-10-F-0045 (10 mg/kg), PL2C-2-10-G-0028 (12 mg/kg), PL2C-2-10-H-0035 (8 mg/kg), and PL2C-2-10-L-0035 (9 mg/kg). Concentrations below the PMCL in deeper samples from PL2C-2-10-G-0060 (6 mg/kg at 6 feet below ground surface) and PL2C-2-10-I-0080 (non-detect at 8 feet below ground surface) suggest that elevated concentrations of arsenic are limited to soil at relatively shallow depth.

**References**

Roy F. Weston, Inc. *Technical Memorandum Appropriateness Evaluation Corrective Measures Study Boeing Plant 2*, March 1999.

Golder Associates Inc. *Compendium of Sampling and Analysis Plans and Quality Assurance Project Plans for Boeing Plant 2 Seattle/Tukwila, Washington*. August 2004.

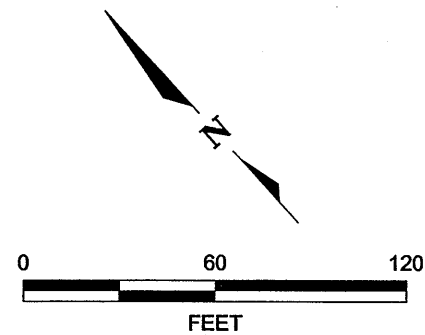
Golder Associates Inc. *Addendum 3 to January 7, 2005 Boeing Plant 2, 2-10 Area Excavation Evaluation*. August 2005.

cc: K. Angelos (Golder)

**Detected Constituents in  
Soil  
2-10 Construction Samples  
September 2005**

013-1646-002.400

Parameter	PMCL	2004 Soil Screening Level	Sample Location: Sample Date: Depth (ft): Sample ID:	PL2C-2-10-A 9/7/2005 4 PL2C-2-10-A-0040	PL2C-2-10-B 9/7/2005 4 PL2C-2-10-B-0040	PL2C-2-10-E 9/9/2005 4.5 PL2C-2-10-E-0045	PL2C-2-10-F 9/9/2005 4.5 PL2C-2-10-F-0045	PL2C-2-10-G 9/14/2005 2.8 PL2C-2-10-G-0028	PL2C-2-10-G 9/14/2005 6 PL2C-2-10-G-0060	PL2C-2-10-H 9/13/2005 3.5 PL2C-2-10-H-0035	PL2C-2-10-I 9/20/2005 8 PL2C-2-10-I-0080	PL2C-2-10-L 10/4/2005 3.5 PL2C-2-10-L-0035
<b>VOCs (µg/kg)</b>												
2-Butanone	-	-		4.9 U	4.9 U	5.2 U	5.4 U	50	6 U	5.3 U	5.6 U	5.6 U
Acetone	255,285,800	-		4.9 U	4.9 U	5.2 U	9.4	260	9.5	5.3 U	40	5.6 U
Carbon Disulfide	-	-		0.98 U	0.98 U	1 U	1.1 U	1.4	1.2 U	1.1 U	1.1 U	1.1 U
Methylene Chloride	96,000	828		2 U	2 U	2.1 U	3.5	4.3	5.5	4.5	2.2 U	9.6
<b>SVOCs (µg/kg)</b>												
Benzo(a)anthracene	2.9	41.9		280	7 U	7 U	7 U	7.8 U	6.8 U	7.1 U	6.3 U	6.3 U
Benzo(a)pyrene	2.9	113		100	7 U	7 U	9.2	7.8 U	6.8 U	7.1 U	6.3 U	6.3 U
Chrysene	2.9	46.6		730	7.6	7 U	11	7.8 U	6.8 U	7.1 U	6.3 U	6.3 U
Di-n-Butylphthalate	291,000	50,900		1,100 B	460 B	670 B	420 B	600 B	440 B	590 B	6.3 U	6.3 U
Fluoranthene	9,000	44,000		180	7 U	7 U	7 U	7.8 U	6.8 U	7.1 U	6.3 U	6.3 U
Phenanthrene	-	-		220	7 U	7 U	7	7.8 U	6.8 U	7.1 U	6.3 U	6.3 U
Pyrene	30,000	1,750,000		790	7.6	7 U	7	7.8	6.8 U	7.1 U	6.3 U	6.3 U
<b>Metals (mg/kg)</b>												
Aluminum	32,581	-		9,370	7,780	10,900	16,500	14,800	7,280	10,000	8,530	11,500
Arsenic	7.3	5		8	9	8	10	12	6	8	5 U	9
Barium	-	93,300		33.2	52.2	51.5	217	55.9	24	30.7	34.6	40.5
Beryllium	0.6	222		0.2	0.19	0.2	0.4	0.3	0.19	0.2	0.1	0.2
Cadmium	1.28	1.21		0.2 U	0.2 U	0.2 U	0.3	0.3	0.2 U	0.2 U	0.2 U	0.2 U
Chromium	1,000	-		12.1	11.6	29.7	26.2	16.7	10.6	12.2	10.1	19.1
Cobalt	-	-		5.5	5.3	7.5	8.2	7.1	5.1	5.1	4.5	6.7
Copper	36.4	1.38		14	15	15.5	31.1	20.3	9.6	16.3	12.3	17.5
Iron	-	-		13,400	12,200	17,400	16,800	17,700	11,800	12,200	11,500	15,100
Lead	400	1,000		7	8	3	38	6	2 U	5	2 U	7
Magnesium	-	-		2,690	2,330	5,470	4,630	3,760	2,160	2,390	2,170	3,880
Manganese	1,146	130		125	116	260	289	202	112	119	98.0	175
Nickel	38.2	10.7		10	9.7	34	28	13	7	10	7	20
Thallium	8.9	0.669		0.2	0.1 U	0.1	0.1	0.1	0.1 U	0.1	0.2	0.2
Vanadium	13,000	56,100		42.4	43.7	40	60	50.4	42.6	43.3	40.3	45.3
Zinc	107	101		30.9	31	31.4	37.6	53	23.7	30.3	25.4	32.4
<b>Petroleum Hydrocarbons (mg/kg)</b>												
TPH - Diesel Range	200	2,000		560	> 50	50 U	79	59 U	50 U	50 U	50 U	50 U
TPH - Motor Oil Range	200	2,000		920	26	100 U	390	120 U	100 U	100 U	100 U	100 U
Notes: - = PMCL or Screening Level not available. Shading indicates detected concentration exceeds PMCL. Bold indicates detected concentration exceeds 2004 Screening Level.												



**LEGEND**

- RCRA AOCs, OAs AND SWMUs
- EXCAVATION AREAS
- SOIL SAMPLE SUBMITTED FOR ANALYSIS (PL2C-2-10-A-0040)

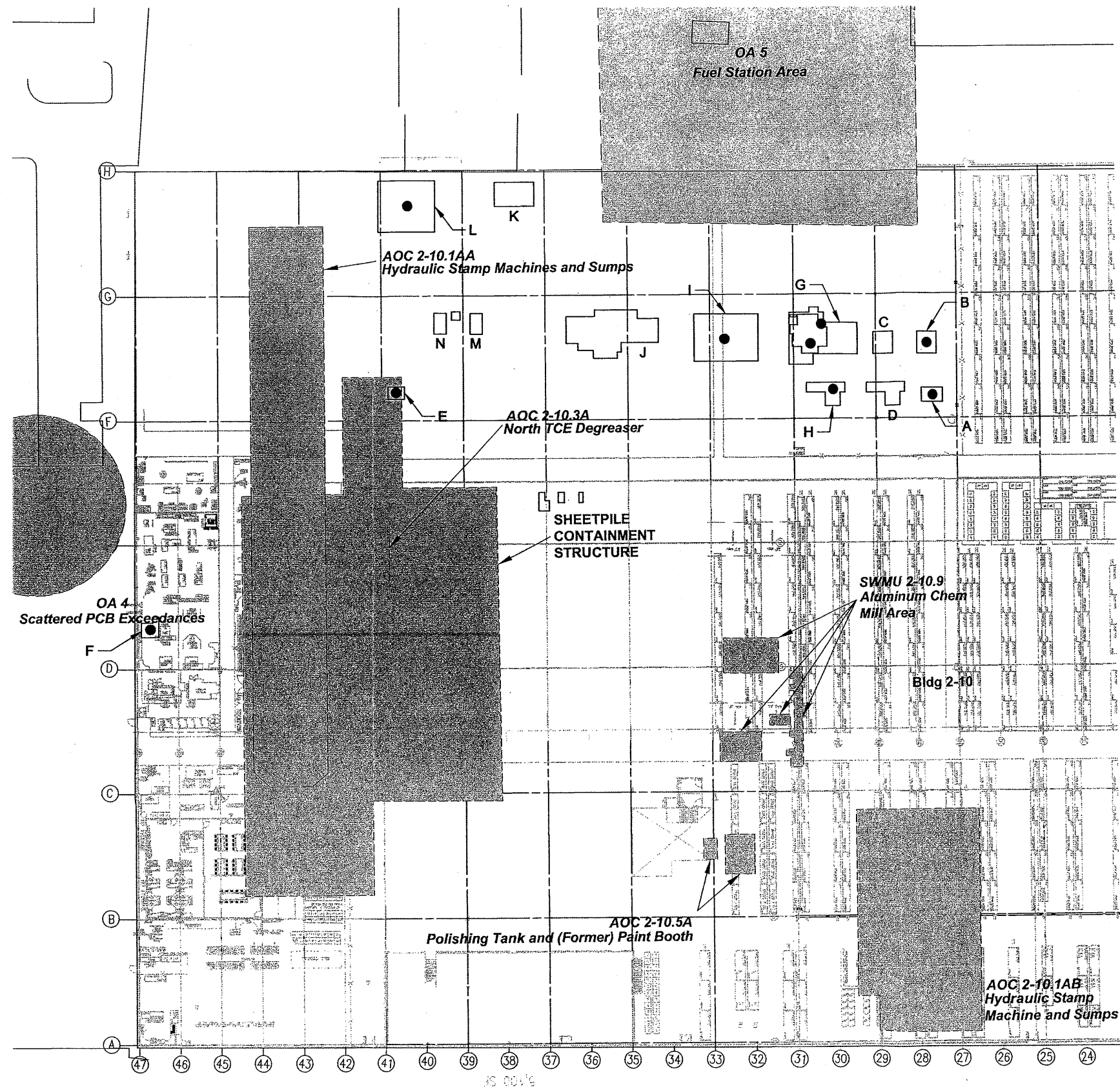


FIGURE **1**  
**BUILDING 2-10 MAP**  
**POST EXCAVATION SAMPLE LOCATIONS**  
 BOEING/PLANT 2 CMS PLANNING/WA